

Abstract Submitted
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Effects of porous insert on flame dynamics in a lean pre-mixed swirl-stabilized combustor¹ MARCUS BROWN, Hastings College, AJAY AGRAWAL, JAMES ALLEN, JOHN KORNEGAY, The University of Alabama — In this study, we investigated different methods of determining the effect a porous insert has on flame dynamics during lean premixed combustion. A metallic porous insert is used to mitigate instabilities in a swirl-stabilized combustor. Thermoacoustic instabilities are seen as negative consequences of lean premixed combustion and eliminating them is the motivation for our research. Three different diagnostics techniques with high-speed Photron SA5 cameras were used to monitor flame characteristics. Particle image velocimetry (PIV) was used to observe vortical structures and recirculation zones within the combustor. Using planar laser induced fluorescence (PLIF), we were able to observe changes in the reaction zones during instabilities. Finally, utilizing a color high-speed camera, visual images depicting a flame's oscillations during the instability were captured. Using these monitoring techniques, we are able to support the claims made in previous studies stating that the porous insert in the combustor significantly reduces the thermoacoustic instability.

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